THE METABOLISM OF *MYO*-INOSITOL BY A MUTANT STRAIN OF *PSEUDOMONAS FLUORESCENS*

BY

MILTON PAUL GORDON

B. A., University of Minnesota, 1950

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SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
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IN THE GRADUATE COLLEGE OF THE
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Introduction

In spite of its wide spread occurrence, the metabolic fate of *myo*-inositol is as yet unknown. Studies with microorganisms have been more successful, probably, because of the more direct pathways involved.

The microbiological oxidation of *myo*-inositol which does not result in ring cleavage has been postulated as proceeding through the following sequence of reactions: *myo*-inositol, an inosose, a diketo-compound, hexahydroxybenzene, tetrahydroxyquinone, and, perhaps, rhodizonic acid. Other investigators have found evidence for the formation of hexahydroxybenzene and tetrahydroxyquinone (1,2).

The studies undertaken in this laboratory were concerned with the metabolism of *myo*-inositol by a mutant strain of *Pseudomonas fluorescens* A3.12 which was isolated by Dr. R. Y. Stanier of the Department of Bacteriology, University of California, Berkeley, California.

Discussion of Results

The oxidation of *myo*-inositol by *P. fluorescens* has been shown to proceed through the initial formation of 2-*myo*-inosose. This compound was identified by means of its elementary analysis, infra-red absorption spectrum, and its pentaacetyl and sodium oximate derivatives.

The autoxidation of hexahydroxybenzene was studied polarographically, and it was found that solutions of this compound in the bacterial medium are extremely unstable in the presence of atmospheric oxygen. This suggests that the rate of destruction of hexahydroxybenzene is much faster than its rate of formation so that it cannot be expected to accumulate in the bacterial medium.

Rhodizonic acid has been identified as a product of the oxidation of *myo*-inositol by *P. fluorescens* A3.12. The

rhodizonic acid was identified by means of the elementary analysis and infra-red absorption spectrum of its mono-phenazine derivative.

A study of the phosphorus uptake of the organism on media with and without added *myo*-inositol suggested that these oxidative reactions do not involve the formation of any appreciable amounts of stable phosphate esters.

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The author was born on February 8, 1930, in St. Paul, Minnesota. After graduating from St. Paul Central High School in June, 1947, he entered the University of Minnesota in the following September, and he received his B. A. degree in June, 1950. During the period from 1947 to 1951 he was the recipient of a Westinghouse Science Talent Search Scholarship. In September, 1950, he entered the Graduate College of the University of Illinois. He held an Upjohn Company Research Fellowship from September, 1950, to June, 1951, and a University of Illinois Research Assistantship from June, 1951, to October, 1953.